

In North Carolina, most soils are acidic and low in nutrients. Good plant growth and yield require the addition of both lime and fertilizer. Soil testing is the best way to find out how much lime and fertilizer to apply based on the crop and existing field conditions.

Purchasing lime and fertilizer is an economic decision, and prices, which have increased dramatically in recent years, are likely to remain high. Spending money on fertilizer when soil test levels are already adequate is not prudent. Soil testing minimizes risk of unnecessary expenditure and safeguards the environment against excess fertilizer application.

Types of Soil Tests

The NCDA&CS Agronomic Division performs predictive and diagnostic soil tests free for all state residents. It is also approved by the N.C. Department of Environment and Natural Resources to measure concentrations of heavy metals on regulated waste-application sites. Heavy metals tests are available from April to December for a fee of \$25 per sample.

Most soil tests are *predictive*. They estimate nutrient requirements for specific crops. Samples for predictive analysis should be taken well before planting. The resulting laboratory report lists levels of nutrients in the soil; measurements of other parameters relevant to plant growth, such as soil pH; and lime and fertilizer recommendations specifically suited to the indicated crop and field.

In fewer cases, soil tests are *diagnostic*. They can help identify nutrient-related problems that occur during the growing season. Such samples should be taken during the growing season whenever

abnormal growth or discoloration occurs. Diagnostic soil reports provide extra information, including an evaluation by an agronomist.

Heavy metals tests measure levels of arsenic, cadmium, chromium, lead, nickel and selenium in addition to the routine soil test parameters, which include copper and zinc. These tests are used only to evaluate regulated sites where industrial waste or sewage sludge has been applied as fertilizer. They are used to assess a site's suitability for waste application and to monitor concentrations of potentially hazardous metals.

What is a Good Sample?

Improperly collected soil samples are the weak link in the soil testing process. When, where and how the sample is taken; what equipment is used; how much information is provided; and how well it is packaged all affect sample quality. Each sample must accurately reflect the variability and conditions in the field. One core from a single location cannot do this.

Each sample should consist of 15 to 20, thoroughly mixed soil cores. The area they represent should have uniform slope and cropping history. Avoid small areas where soil conditions differ markedly from those in the rest of the field—wet spots, severely eroded areas, old building sites, fence rows, spoil banks, burn row areas and old woodpile or fire sites. If an area is unique and large enough to manage separately, then it should be sampled separately.

Instructions for collecting, packaging and submitting soil samples are available from the Agronomic Division's Web site at www.ncagr.com/agronomi/uyrst.htm.

The NCDA&CS Soil Analysis

Routine soil tests measure

- * pH and acidity;
- * levels of major plant nutrients, including phosphorus, potassium, calcium, magnesium and sulfur;
- * levels of plant micronutrients, including copper, manganese and zinc;
- * levels of sodium;
- * soil class;
- * percent base saturation;
- * percent humic matter;
- * cation exchange capacity and
- * weight-to-volume ratio.

Based on these data, soil reports provide site-specific fertilizer and lime recommendations. Reports for problem diagnosis also include a measurement of soluble salt content.

Soil test methodology varies from laboratory to laboratory. The NCDA&CS soil lab performs tests and generates results based on sample volume, not weight; and it uses the Mehlich-3 soil extractant and Mehlich buffer pH method. Growers who send samples to private soil labs should be aware that the test results they receive may not be comparable with NCDA&CS test results if other methods are used.

Soil Testing May Be Inappropriate if . . .

NCDA&CS soil tests are designed specifically for chemical analysis of native North Carolina soils. Materials such as pine bark, composted materials, mulch and/or potting media should not be submitted as "soil" samples. Growers, especially nurserymen, who would like these types of materials tested for chemical